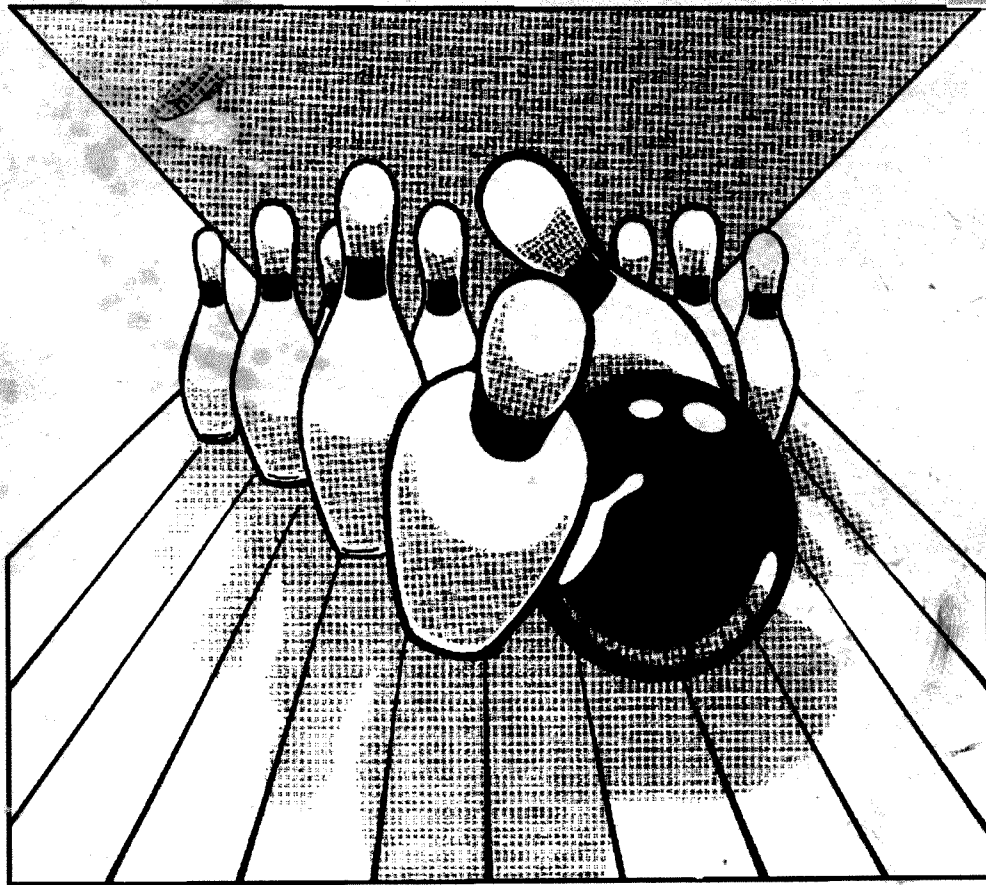


STRATATM BOWLING



INSTALLATION MANUAL



STRATA GROUP, INC.

SERVICE/SALES (800) 262-0323

FAX (708) 437-2473

WARRANTY, REPAIR, AND RETURN POLICY

1. *90 day full warranty on all electronic components.
2. There is a minimum \$40.00 service charge for all non-warranty repairs or returns.
3. For all servicing return to **STRATA**.
4. ANY non-factory repair or attempted repair voids warranty.
5. AAMA decal must not be removed from the PC boards.

* All warranty periods begin on the date of purchase from **STRATA**

RETURN MERCHANDISE AUTHORIZATION - (RMA)

1. All returned merchandise must have an RMA number marked clearly on the outside of the package.
2. You must obtain all RMA numbers from your authorized **STRATA** distributor. Please have your **STRATA** serial number available when calling for an RMA number.
3. Merchandise returned without an RMA number will not be accepted.
4. Advance replacement boards will be shipped to distributors, or at the distributor's request, will be shipped directly to the operator.
5. Advance replacement boards will be billed to the distributor until **STRATA** receives the returned board, at which time a credit will be issued.
6. All repairs and/or replacements will be shipped within 24 hours of receipt or request (subject to availability).

BEFORE YOU START...

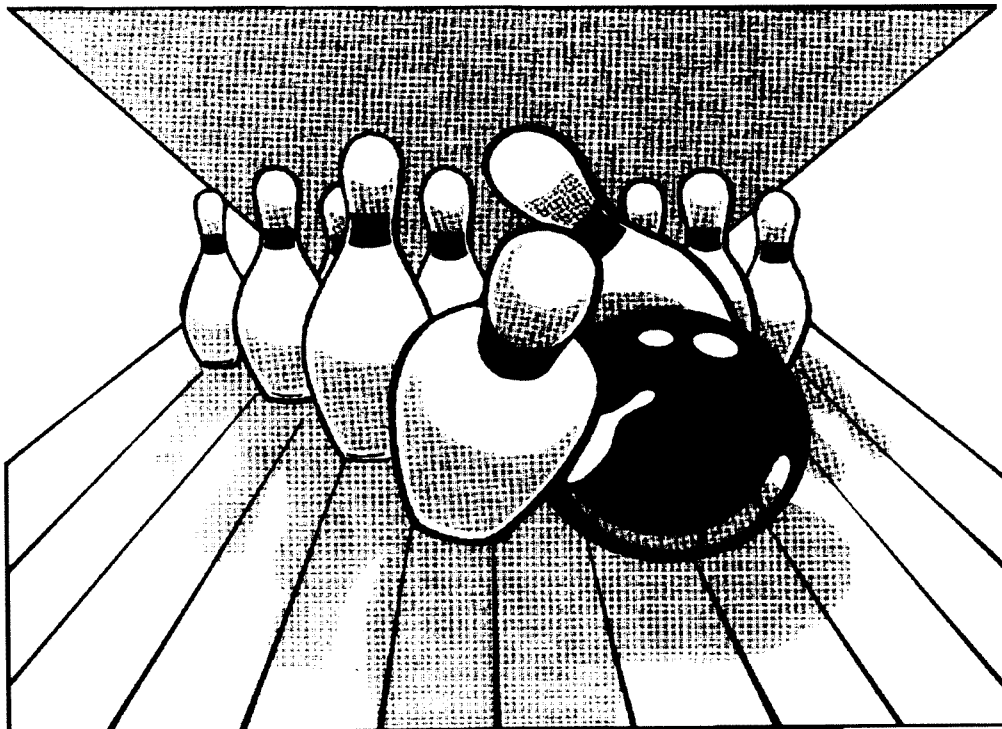
1. Have you checked to see if all the needed parts have been included?
2. Is the game you have chosen to convert able to supply all the required voltages for the new game (+5, & +12 vdc)? NOTE: some games (i.e. Ms. Pac Man, Galaxian, etc.) regulate their voltages on the main PC board. This makes the existing power supply inappropriate and hazardous to your new game. These games will require a power supply change. Many game supply houses can offer you a switching regulated power supply for a relatively low cost. Ask your distributor.
3. Is the monitor configuration compatible? It can be difficult to change the monitor from a horizontal to a vertical mount. Installation will be easier if you choose a vertical mount cabinet.
4. Do you have the necessary tools? (See the recommended tool list on page 5).

FCC REGULATION COMPLIANCE

This device complies with the limits for a class "A" computing device pursuant to sub-part "J" of part 15 of FCC rules, which are designed to provide reasonable protection against interference when operated in a commercial environment.

The use of an aluminized cardboard PC board cage with this game is not necessary for FCC compliance and is discouraged.

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be necessary to correct the interference.



INSTALLING YOUR **STRATA BOWLING™** CONVERSION PACKAGE

TABLE OF CONTENTS:

New Game Package Contents	4
Power and Monitor Requirements	4
Recommended Tools and Supplies	5
Installation Procedures	6
Control Panel Positioning	12
Ticket Dispenser Installation	13
Diagnostics, Adjustments, and Accounts	15
Main Harness Connections	19

STRATA BOWLING

PACKAGE CONTENTS

UPRIGHT KIT

- 1) Printed Circuit Board (PCB)
- 1) Set of Nuts, Bolts, and Spacers
- 1) Connecting Wire Harness (JAMMA)
- 1) Trackball Assembly
- 3) Button Assemblies
- 1) Marquee Styrene
- 1) Marquee Plexiglas
- 1) Control Panel Overlay
- 1) Set of Side Graphics (2 pieces)
- 1) Set of Function Labels
- 1) Manual

COCKTAIL KIT

- 1) Printed Circuit Board (PCB)
- 1) Set of Nuts, Bolts, and Spacers
- 1) Connecting Wire Harness (JAMMA)
- 2) Trackball Assemblies
- 6) Button Assemblies
- 2) Control Panel Overlays
- 2) Sets of Function Labels
- 1) Manual

POWER REQUIREMENTS:

+5 VDC	2 amps
+12 VDC	2 amps

MONITOR REQUIREMENTS:

Vertical Mount Raster Scan
Positive or Negative Composite Sync

NOTE: The monitor must be mounted vertically. If possible, it is best to lay the monitor as flat as possible to allow for smooth use of the trackball.

RECOMMENDED TOOLS AND SUPPLIES

- Phillips and Slotted Screwdrivers
- Socket Set
- Wire Cutters and Strippers
- Pliers or Channel Locks
- Electric Drill with 3/32", 1/4", and 7/16" Bits
- 1-3/16" Chassis or Sheet Metal Punch
- Small File
- Razor Knife and Sharp Blades
- Straight Edge
- Painting Supplies (if you do your own painting)
 - Air Brush or Paint Sprayer
 - Paint Roller and Pan
 - Paint Brush
 - Paint (and primer)
 - Sand Paper
 - Putty Knife and Wood Putty
- Staple Gun and Staples
- Soldering Iron and 60/40 Resin Core Solder
- Vacuum Cleaner
- Assorted Fastening Hardware
- Heat Shrink Tubing (3/32", 1/8", and 3/16")
- Masking Tape
- 3-1/2" or 4" Wire Ties
- Mild Liquid Soap and Water Solution

IMPORTANT NOTE

Through usage of the very latest technology this game requires far less power to operate than most games currently on the market. The outputs of many "regulated" switching power supplies actually vary with load. For this reason the power supply from an old game may not be correctly adjusted for STRATA BOWLING. Therefore, it is very important to adjust the +5 vdc supply WITHOUT connecting the PC Board, then readjusting later, after the PC Board has been installed. Damage will occur if the power supply is outside the acceptable limits (between 4.8 and 5.5 vdc).

Something to Think About

You have made a wise decision to transform an old game into this new game. This is by far the most cost effective alternative to maximize the return of your initial investment. All you provide is the cabinet with a power supply and monitor. We provide the rest. The end result is a new game at a very low cost.

Spend time on the cabinet's appearance (i.e. marquee, control panel, and cabinet graphics). You will raise your profits with the introduction of a new game package, especially if the cabinet looks clean and new.

The "new game look" should always apply to the inside of your game as well. A few wire ties and shrink tubing on your harness, some fastening hardware on your subassemblies, and a sweep with the vacuum cleaner will ensure that unnecessary glitches do not occur.

INSTALLATION PROCEDURES

GETTING STARTED...

Preparing the Original Game for the New Game

Remove the following:

1. Main Logic Board(s)
2. Control Panel
3. Monitor Plexiglas
4. Monitor Bezel
5. Marquee
6. Cabinet Graphics

For a fresh look, painting is highly recommended. Spray painting gives a better finish but if an air brush or paint sprayer is unavailable, a roller is second best. Be sure to cover all exposed surfaces not to be painted, such as the coin door and monitor. Use a small brush to finish up the details. If you do not have the facilities for painting, try an auto body shop.

If your cabinet has wood grain sides, remove the old graphics and adhesive. Adhesive may be removed with lacquer thinner.

Thoroughly clean out your cabinet.

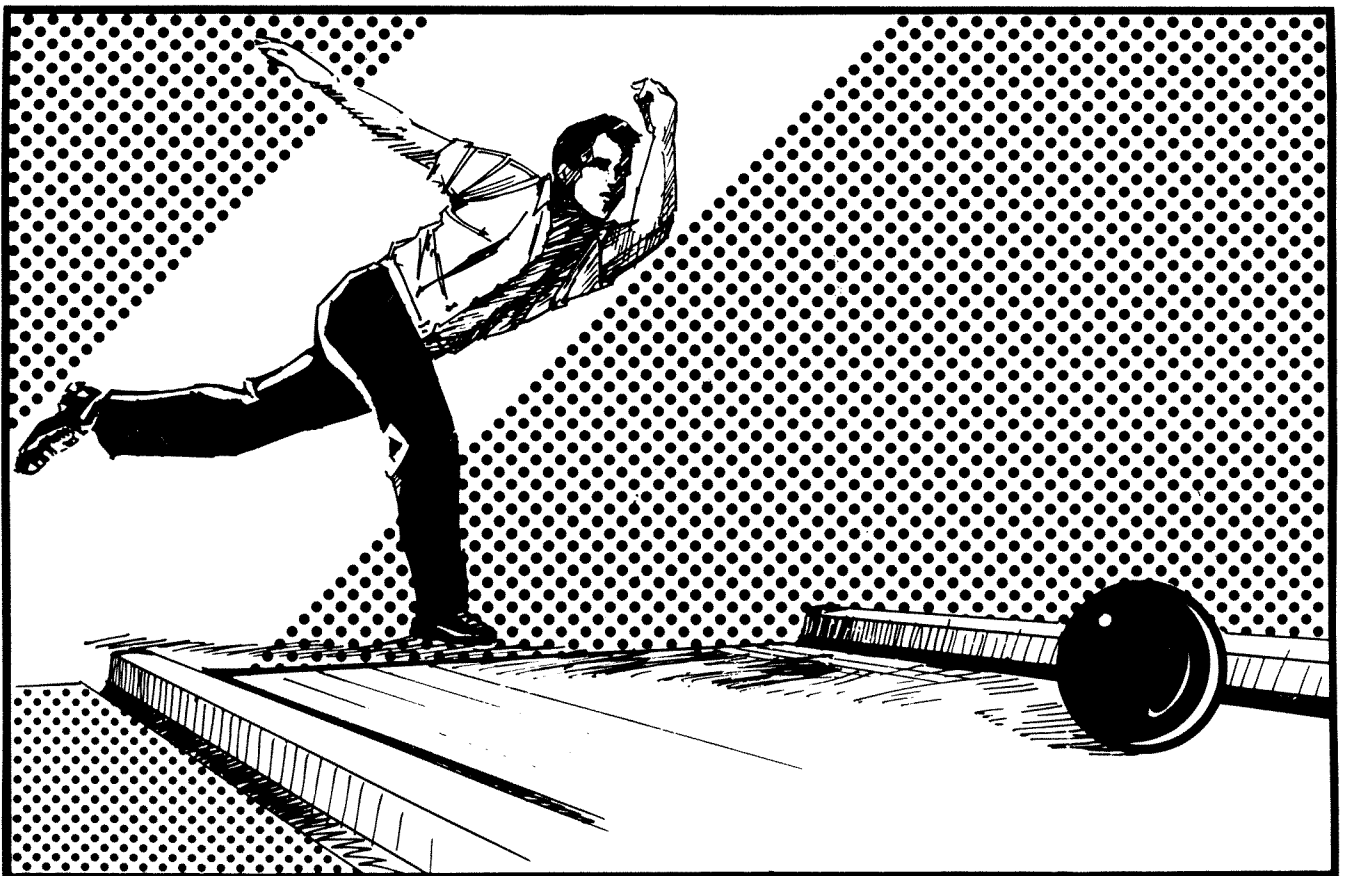
Note concerning JAMMA harnesses:

This game uses the JAMMA standard wiring harness. Therefore, if the cabinet you are using is already equipped with a JAMMA harness, your wiring work will be greatly simplified. However, a few differences need to be noted:

The trackball used in this game connects to where a joystick would have been; what was up, down, left, and right is now x-direction, y-direction (dir), x-clock, and y-clock (clk), respectively. If you are using a cabinet which already has a JAMMA wiring harness, you will need to change over the joystick wires to trackball connectors. Notice how they are wired on the provided harness.

Since this is a one to four player game, only one start switch (player one start) is used. All other signals follow the JAMMA standard.

If you are installing this game into a Dynamo cabinet with a pre-installed JAMMA harness you will notice that it does not have a wire for the service switch. You will have to add a contact to the edge connector at the proper position (position R). Some cabinets (Dynamo included) have only one coin switch input and the coin switches are wired together. This prevents you from setting the left and right coin slots to different coinages. If you need different coinages, you will need to wire the switches separately.



INSTALLATION...

REMEMBER! Do NOT work with any part of the system plugged in (lights, monitor, or power supply).

Printed Circuit Board (PCB):

Mount the PCB to the side of the cabinet. Use the board as a guide and mark where to drill mounting holes. Drill pilot holes (3/32"). Attach the PCB to the cabinet with wood screws and spacers -- snug but not too tight or the board may warp or crack. Mount the PCB with the edge connector toward the top. This will keep the wiring harness from slipping off due to vibration. Be sure the board is not being flexed in any way.

Wire Harness:

Attach the wire harness connector to the PCB. This connector should be keyed and labeled "**COMPONENT SIDE**". Be sure it is mounted correctly. Notice the power supply wires on the board are closest to the end marked "Jamma".

Connecting the Wire Harness to the Existing Wires:

When you hook up the control panel, power supply, monitor, or other subassemblies that remain in the game cabinet to your new wire harness, try to use the existing secondary connector (none are provided).

1. Cut the original wire approximately three inches from the original connector. Strip off about 1/2" of insulation.
2. Slide a piece of heat-shrink tubing over the end.
3. Do not leave a lot of excess wire spooled up in your cabinet. Cut the wire from your new game harness to the length you need plus a few extra inches. Leave enough for proper cable dressing - do not make it stretch across the inside of the cabinet.
4. Solder the new wire to the original wire. Use a straight in-line splice.
5. Melt the heat-shrink over the splice.

ALWAYS: solder all wire splices. Just twisting the wires together will cause intermittent problems in the future;

use shrink tubing over wire splices. **NEVER** use electrical tape. Electrical tape may unravel due to the heat inside the cabinet;

use wire ties to keep associated wires bundled. Attach to the cabinet wherever it seems necessary to keep them neat and secure.

AVOID: bundling unrelated wires (such as the control panel and the monitor) as this may increase the likelihood of intermittent problems due to noise. Run different bundles separately.

Power Wires:

1. Connect the wires that are designated for your power supply. You will need a supply of +5 vdc, and +12 vdc. The +5 vdc must be regulated to within 5% (+ or - 0.25 vdc). The others may be unregulated but should not stray too far or the sound may be affected. If the old game's supply does not provide these voltages, it will have to be replaced. A switching-type supply is recommended.
2. You will notice that you have more than one wire for each voltage. Use all wires supplied on the harness. This will ensure better power transmission and prevent overloading of the edge connector pads.
3. Tin all power supply wires before connecting them to the power supply. Loose strands may short out the supply. For best results, connect spade lugs to the ends of the power wires and attach to the screw terminals of the power supply.

Monitor Wires:

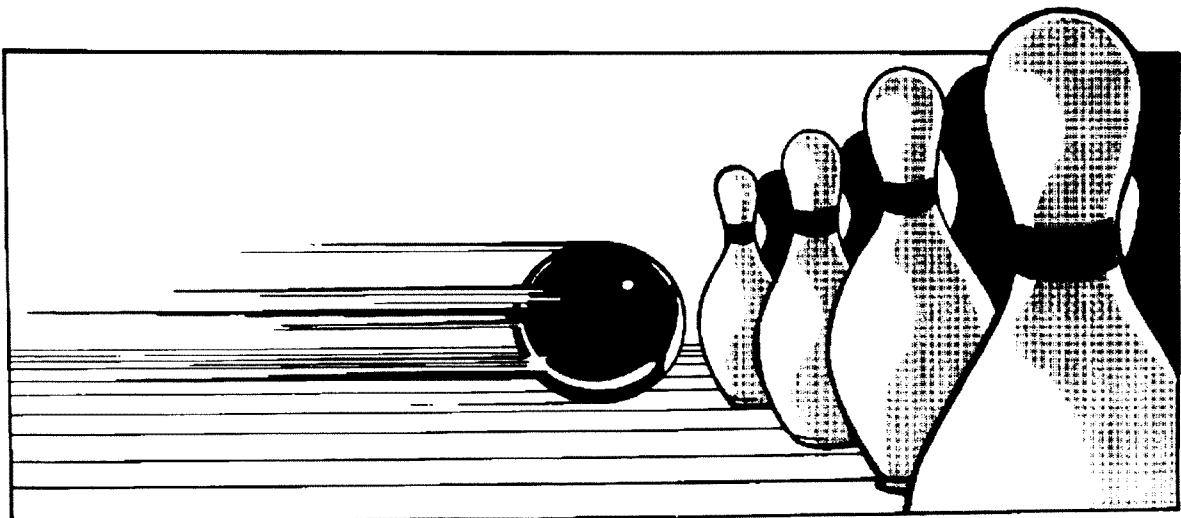
You will be connecting the RED, GREEN, and BLUE video drives along with the composite SYNC and video GROUND wires.

SYNC:

This is the recommended approach for a Wells-Gardner monitor and should work with some others as well.

This game generates a composite sync signal which is accepted by most monitors. A DIP switch (SW1) on the logic board allows you to choose between positive and negative composite sync. Most monitors require negative sync. If your monitor requires positive sync, flip the switch towards the ON position.

If your monitor does not have a composite sync input but has separate horizontal and vertical sync inputs, try connecting the composite sync signal from the PCB to the horizontal sync signal on the monitor. This should produce a satisfactory result, although some adjustment of the monitor's sync controls may be necessary.



Speaker Wires:

Connect the speaker wires paying attention to their polarity.

If your cabinet has two speakers, connect both. If they are 8 or 16 ohm speakers connect them in parallel, if they are 4 ohm, connect them in series.

Examine the speaker carefully. Is it really up to the high standards you wish to maintain at your location? Unfortunately, many arcade speakers are inadequate for reproduction of good game sounds. Remember, this is not just a video game -- it is a video/audio game. Far more effort was put into the sounds of this game than is put into most other arcade games. If the speakers are not up to it, replace them. A small investment in good speakers can make a world of difference in profits. Competent and reasonably priced speakers can be obtained from stores such as Radio Shack. Part numbers 40-1909B and 40-1268C both work well, with the latter being recommended. Car speakers also work well.

Position speakers as far from the monitor as possible. If placed too close, the speaker's magnet may deflect the monitor and cause strange coloration, which can usually be corrected by degaussing the monitor. Be sure to attach it securely with all four screws to minimize vibration and rattling. Make sure everything else in the cabinet is attached securely for the same reason.

Coin Door Wires:

1. Connect the designated wires to the coin switches.
2. Connect the door lamps to the +5 vdc or -5 vdc supply. Some games have separate power supply outputs for the lamps.
3. Mount a service switch (not included) somewhere convenient inside the coin door area. This switch allows you to enter adjustables, run diagnostics, and see or clear audits. Make it readily accessible through the coin door.
4. Clean and lubricate your old coin mechs.

INITIAL TEST...

1. Carefully inspect the game for loose power wires, exposed connections, and extra fastening hardware. Look for any stray strands from wires.
2. Make sure the PC board, monitor, power supply, and speakers are secure.
3. Double check your connections.
4. With the board disconnected from the harness, turn the power on and adjust the +5 supply to be as close to +5 vdc as possible. **This is very important to prevent damage to the game board.** Turn the power off and connect the harness to the board.

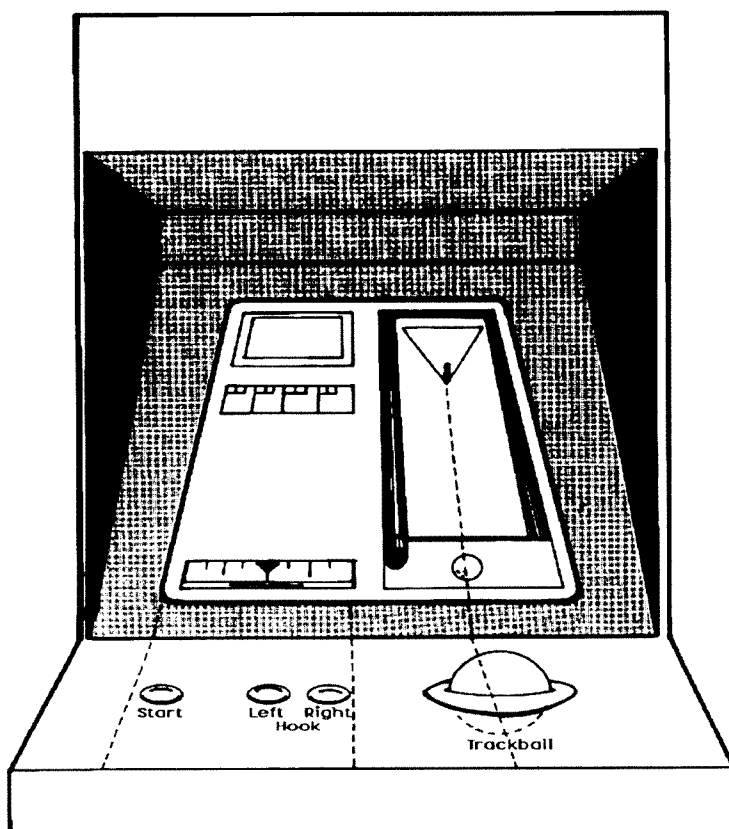
APPLYING POWER...

1. Plug in the game and turn it on.
2. Look and smell for smoke (TURN IT OFF *IMMEDIATELY* IF ANY IS NOTICED).
3. Make sure the green and yellow LEDs on the PC board are flashing. If not, something is wrong -- turn off the game.
4. Listen for sound. A few notes should play on power up.
5. If you do not hear any sounds and the green LED is flashing, try turning up the volume and check the speaker connections. Dropping a coin through a coin switch should cause a sound.
6. Look at the image on the monitor. If it is not in sync and you can not stop it from rolling by adjusting the monitor's sync controls, try flipping SW1 on the logic board.
7. How is the picture?
 - o Is it centered?
 - o Is it too bright, too dim?
 - o Is it in focus?

Check your monitor manual to make adjustments. Some test patterns are available through the game's diagnostics by pressing the service switch. Use them when making any adjustments. See page 17 for information about diagnostics. Proper monitor adjustment is very important.

Control Panel Assembly:

1. Remove all the old buttons, joysticks and wires from the control panel and set aside. Do not remove the original panel overlay until the new holes have been drilled.
2. Mark positions on the panel for new holes.
3. Drill (or punch) the holes marked for buttons and bolts. Use a chassis or sheet metal punch for best results on button holes. Cut a hole for the trackball bracket. Position the center of the trackball in the center of the bowling alley on the screen. If possible, mark the hole with the game on. If you have a 3-inch chassis punch you can use it to punch a hole for the trackball instead of using the bracket. The trackball mounting bolts should form a diamond, not a square.
4. Use a file to smooth out the edges of all the new holes.
5. Cover old holes with a wood or metal plate.
6. Remove the original graphics overlay. Clean up the panel. Peel the top half of the protective backing off of the graphics. Start from the center and smooth out your overlay making sure you have about an inch of excess coming off the top. Watch out for bubbles. Peel off the bottom half and repeat. Trim off the excess overlay material with a sharp razor knife.
7. Adhere the function labels. Be sure they are straight.
8. Wire up the mounted trackball and buttons. Observe that the trackball connects with a six-pin nylon Molex connector.



Marquee Installation:

Using the original marquee as a template, center your new marquee graphics and score the new marquee deeply to fit the cabinet. Break off excess with pliers. Be sure the light behind the marquee works.

Side Graphic Installation:

1. The sides of the cabinet should be very clean, smooth, and free of any old adhesive, dust, etc.
2. Mark position of decal lightly with pencil (centered on upper half of cabinet).
3. Spray the side of the cabinet with soap and water solution and leave wet.
4. Peel off the top 1/4 of the decal backing and apply to the cabinet starting at the top with a smoothing motion. Smooth down until decal is in place.
5. Squeegee all bubbles and ripples out of the decal. Use a piece of cardboard if you do not have a squeegee.
6. Position the decal exactly. The cleaner will allow some movement. Allow several hours to dry completely.

Ticket Dispenser Installation:

This game is capable of dispensing tickets through a Deltronics DL-1275 or similar ticket dispenser. Connection is through the 4-pin Molex plug at the right edge of the board marked "TICKET". It is pinned out as follows:

PIN	FUNCTION
-----	----------

1	Ticket Sense
2	Ground
3	Motor Enable
4	+12 vdc

Note that pin 1 is nearest to the edge connector (and marked with a "1").

This is the same pin out (with a different connector) as the Deltronics DL-1275. If you wish to connect a ticket dispenser to this game you will have to make a cable with the proper connectors. The DL-1275 mates with a Molex #03-09-1041 or #03-09-1042. The game board connector mates with a Molex #22-01-2047 or #22-01-3047. Simply connect pins 1 through 4 on one end directly to pins 1 through 4 on the other end. If the ticket dispenser is not a DL-1275 you may need a different cable. Other electro-mechanical devices can be connected through this connector provided they use the same signals. The Motor Enable output is TTL-compatible and is high when the motor is turned on. The Ticket Sense input expects an open-collector TTL signal where low indicates the sensor is not blocked. When a ticket is to be issued, the Motor Enable line goes high until either the Ticket Sense line goes high then low again (indicating a ticket has passed) or until about 1/3 of a second passes (meaning dispenser is empty or jammed).

Finishing Touches:

1. Check the game inside and out for any imperfections. Secure any loose wiring or fastening hardware.
2. Make sure the coin door is tight and the coin mechs are well adjusted.
3. Make sure all subassemblies are firmly attached. Anything which is not mounted securely will rattle when the game is played. This game makes use of low-frequency sounds which can cause any loose joints to rattle.
4. Power up the game. Try both coin switches. Drop quarters or tokens through to check the coin mechs. Make sure the game is adding credits. Play the game. Do the start and hook left/right switches work? Does the trackball work properly? The trackball can be installed wrong (rotated) fairly easily. If the ball on the screen moves in different directions than the trackball, make sure it is not rotated and that the proper connectors go to the proper opto-boards. Try playing the game with the volume up and listen for rattling as you bowl. Tighten anything which is making noise.

Setting The DIP Switch:

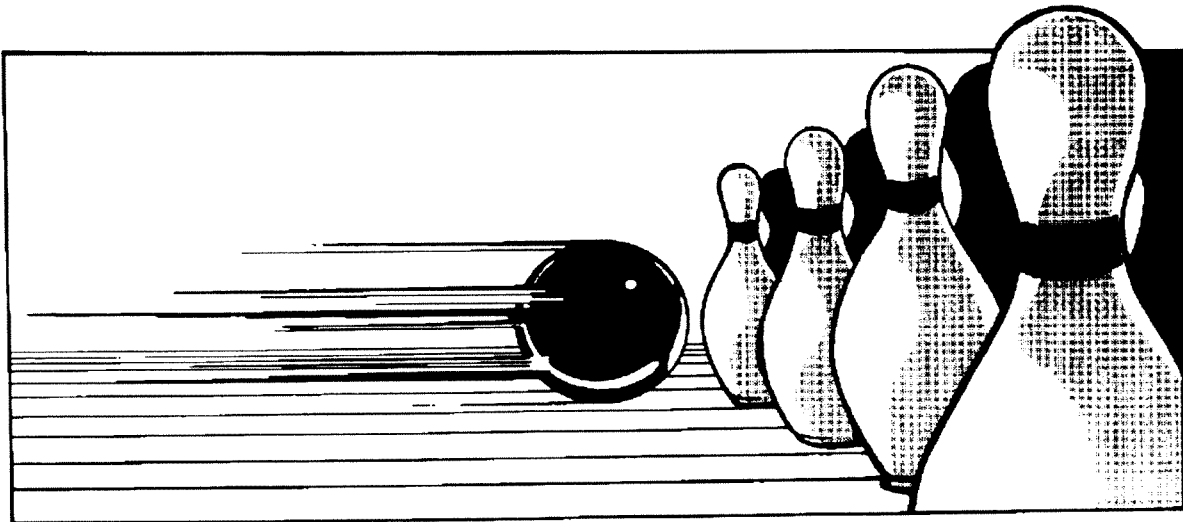
The DIP switch (SW1) is used for setting the upright/cocktail mode and video sync.

Position 1 - OFF - Negative Sync
ON - Positive Sync

Position 2 - OFF - Upright
ON - Cocktail

Position 3 - Not Used (Set To OFF)

Position 4 - Not Used (Set To OFF)



SETTING UP THE GAME...

Upon initial power-up, the game will initialize to factory default settings. These settings affect game elements such as number of credits per coin, number of strokes per credit, bonus stroke values, difficulty level, ticket dispenser on or off, etc.. The following section will describe how to alter these settings, view the system audits, or run system diagnostics.

Operator adjustables, audits, and diagnostics can be accessed by pressing the service switch at any time. Settings and audited accounts will be saved after the power switch is shut off. When power is turned back on, the message "SYSTEM STATUS OK" will be displayed. If for some reason any of the settings or accounts were corrupted, or if the power is being applied for the first time, the message "SYSTEM INITIALIZED" will be displayed and all factory defaults will be reinstalled. The battery on the logic board should have a life of approximately five years.

Pressing the service switch will take you to the operator service mode main menu. You will see this:

```
EXIT
OPERATOR ADJUSTABLES
AUDITS
DIAGNOSTICS
EXCITER DEMOS
```

One of these items will be highlighted in red. To select an item, move the trackball up or down to highlight the desired item and press start.

The main menu will lead to a series of menus. Use the trackball the same way to move from one menu to the next. Exiting any menu will lead back to the previous menu. When "EXIT" is selected from the main menu, the game will return to the attract mode.

OPERATOR ADJUSTABLES

The "OPERATOR ADJUSTABLES" menu allows you to customize the game by adjusting various game features.

FREE PLAY ENABLE:

"FREE PLAY ENABLE" allows you to select between "YES" or "NO". "NO" is the default.

RESETS:

There are four levels of reset: "RESET OPERATOR ADJUSTABLES" will only restore the operator adjustables to their factory settings; "CLEAR AUDIT TOTALS" will set all of the audit data to zero; "RESET HIGH SCORES" will reset the high score information only; "RESET ALL" will reset all operator adjustables to factory default settings, reset high scores, and reset all audit accounting data.

ATTRACT MODE SOUNDS:

The three levels of attract mode sounds are: "ALL ATTRACT MODE SOUND ON", "ATTRACT MODE MUSIC OFF", and "ALL ATTRACT MODE SOUND OFF". The default setting is "ATTRACT MODE MUSIC OFF"

DIFFICULTY ADJUSTMENTS:

Select from one of five difficulty levels.

CREDITS PER COIN DOOR SETTINGS:

Select the number of credits the right and left coin doors will be worth. The default is 1 credit per coin for both left and right doors.

NOTE

Like before, move the trackball up or down to select the desired item. Once on the desired item, move the trackball left or right to change the value. This will be true for any adjustable items that might be described below as well as the "CREDITS PER COIN DOOR SETTINGS".

TRACKBALL ADJUSTMENT:

There are five possible trackball settings which affect the trackball sensitivity. The purpose of the trackball adjustments are to allow the operator to use a cabinet where the monitor might not be laying parallel with the control panel. We suggest that you use a cabinet with the vertical monitor mounted as close to parallel with the control panel as possible. However, if you are using a cabinet with the monitor nearly perpendicular to the control panel, you can prevent players from hitting their hands on the glass by using a more sensitive trackball setting.

TICKET DISPENSER SETTINGS

This game is able to dispense tickets if the cabinet is equipped with a ticket dispenser. To enable the ticket dispenser, select "TURN TICKETS ON OR OFF" then select "ON". The default setting is "OFF". To set the levels to dispense tickets select "SET AWARD LEVELS". To set the number of tickets to be dispensed, select "SET NUMBER AWARDED".

Please note again that the tickets will only be dispensed if the ticket dispenser is enabled by selecting "ON" from the "TURN TICKETS ON OR OFF" menu.

AUDITS

The "AUDITS" section will present to you a variety of game information. This information can be helpful in adjusting the operator adjustables described previously.

TOTAL PLAYS:

This is the total number of times the game has been played.

TOTAL CREDITS:

This is the total number of credits that the game has given for taking in some number of coins. We will talk in terms of credits since a coin can be worth any number of credits (see "CREDITS PER COIN DOOR SETTINGS" on page 17). However, if the credits per coin setting is 1, then a credit and a coin are the same.

TOTAL LEFT DOOR CREDITS:

This is the number of credits given for taking in coins through the left coin door.

TOTAL RIGHT DOOR CREDITS:

This is the number of credits given for taking in coins through the right coin door.

AVERAGE CREDIT TIME:

"AVERAGE CREDIT TIME" is the average amount of time (in seconds) being consumed for a player to use one credit.

TOTAL TICKETS DISPENSED:

This is a count of the total number of tickets dispensed to the players.

TOTAL 1 PLAYER GAMES:

This is the total number of single player games played.

TOTAL 2 PLAYER GAMES:

This is the total number of two player games played.

TOTAL 3 PLAYER GAMES:

This is the total number of three player games played.

TOTAL 4 PLAYER GAMES:

This is the total number of four player games played.

TOTAL PLAYS OF NORMAL BOWLING:

This is the total number of plays of Strata regulation bowling.

TOTAL PLAYS OF FLASH BOWLING:

This is the total number of plays of Flash bowling.

TOTAL PLAYS OF STRIKE OR DIE:

This is the total number of plays of Strike Or Die.

DIAGNOSTICS

The diagnostics section is used for running a variety of system tests.

VIDEO TESTS:

Test color and linearity of video display.

MEMORY TESTS:

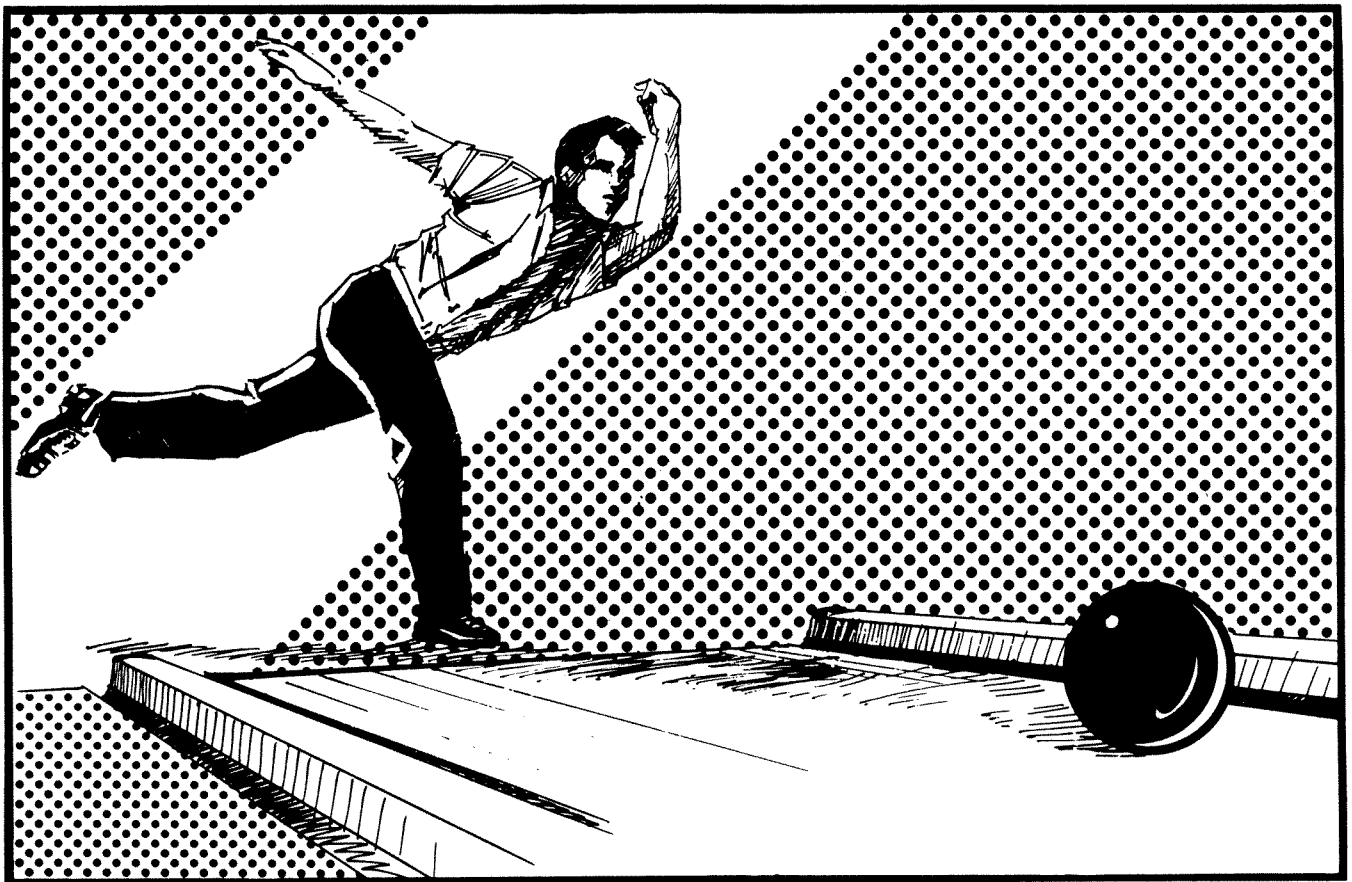
Test for RAM and ROM validity.

SOUND TESTS:

Test used for determining if the sound system is functioning.

CONTROL TESTS:

Test functionality of all game controls.



UPRIGHT - JAMMA HARNESS

WIRE COLOR	SOLDER SIDE	PARTS SIDE		WIRE COLOR
Black	GND	A 1	GND	Black
Black	GND	B 2	GND	Black
Red	+5 vdc	C 3	+5 vdc	Red
Red	+5 vdc	D 4	+5 vdc	Red
		E 5		
Orange	+12 vdc	F 6	+12 vdc	Orange
	KEY	H 7	KEY	
		J 8	Coin Count	Blue-White
		K 9		
Yellow-Red	Speaker -	L 10	Speaker +	Red-Yellow
		M 11		
Green	Video Green	N 12	Video Red	Red
White	Video Sync	P 13	Video Blue	Blue
Brown	Service	R 14	Video GND	Black
		S 15		
Green-Yellow	Coin 2	T 16	Coin 1	White-Yellow
		U 17	Start 1	Brown-White
		V 18	X-Dir 1	Red-White
		W 19	Y-Dir 1	Orange-White
		X 20	X-Clk 1	White-Red
		Y 21	Y-Clk 1	White-Orange
		Z 22	Face Left 1	White-Brown
		a 23	Face Right 1	Yellow-White
		b 24		
		c 25		
		d 26		
Black	GND	e 27	GND	Black
Black	GND	f 28	GND	Black

COCKTAIL - JAMMA HARNESS

WIRE COLOR	SOLDER SIDE	PARTS SIDE		WIRE COLOR
Black	GND	A 1	GND	Black
Black	GND	B 2	GND	Black
Red	+5 vdc	C 3	+5 vdc	Red
Red	+5 vdc	D 4	+5 vdc	Red
		E 5		
Orange	+12 vdc	F 6	+12 vdc	Orange
	KEY	H 7	KEY	
		J 8	Coin Count	Blue-White
		K 9		
Yellow-Red	Speaker -	L 10	Speaker +	Red-Yellow
		M 11		
Green	Video Green	N 12	Video Red	Red
White	Video Sync	P 13	Video Blue	Blue
Brown	Service	R 14	Video GND	Black
		S 15		
Green-Yellow	Coin 2	T 16	Coin 1	White-Yellow
Orange-Blue	Start 2	U 17	Start 1	Brown-White
Green-Black	X-Dir 2	V 18	X-Dir 1	Red-White
Brown-Green	Y-Dir 2	W 19	Y-Dir 1	Orange-White
Green-Orange	X-Clk 2	X 20	X-Clk 1	White-Red
Brown-Blue	Y-Clk 2	Y 21	Y-Clk 1	White-Orange
White-Purple	Face Left 2	Z 22	Face Left 1	White-Brown
Green-Blue	Face Right 2	a 23	Face Right 1	Yellow-White
		b 24		
		c 25		
		d 26		
Black	GND	e 27	GND	Black
Black	GND	f 28	GND	Black



709 West Algonquin Road
Arlington Heights, IL 60005
(708) 437-2704